Series and Parallel Circuit Analysis

1) How would the brightness of the individual bulbs in a series circuit change as bulbs of the same resistance are added?

- reduce brightness
  ↳ series circuit, brightness controlled by V

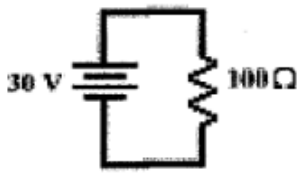
2) If one bulb (1 ohm) is in a series circuit and the switch is open what is the voltage drop across the lamp?

Zero
↳ switch is open

3) What happens to the amount of current in a series circuit when two more 1 Ω resistors are added to it?

$V = IR$ - voltage is the same, but R is increased
$I = \frac{V}{R}$ ∴ current decreases

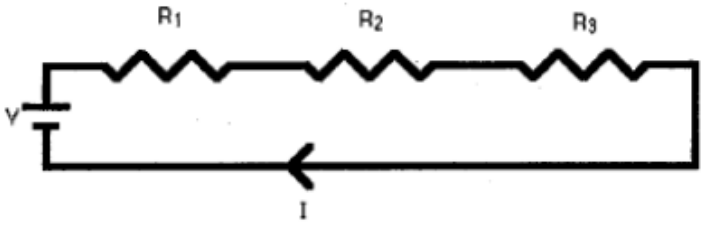
4) Solve the following circuits.



	V	I	R
R_1	30	0.3A	100
Total	30	0.3A	100

$I = \frac{V}{R} = 0.3A$

R1= 8 Ω, R2 = 8 Ω, and R3 = 4 Ω. The cell is a 10 V cell.

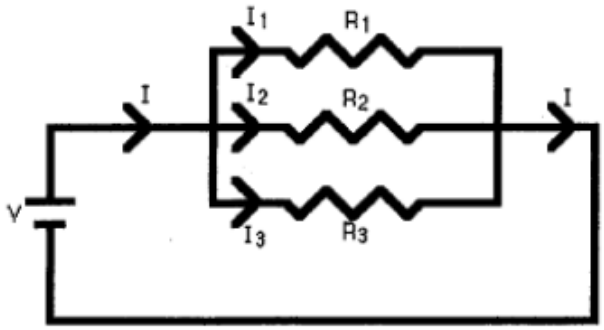


	V	I	R
R_1	4 V	0.5A	8Ω
R_2	4 V	0.5A	8Ω
R_3	2 V	0.5A	4Ω
Total	10 V	0.5A	20Ω

$I = \frac{V}{R}$

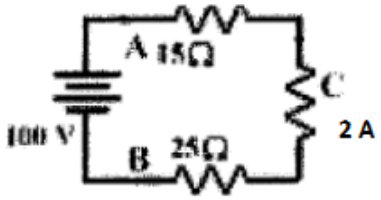
$I = \frac{10V}{20R}$

$I = 0.5A$

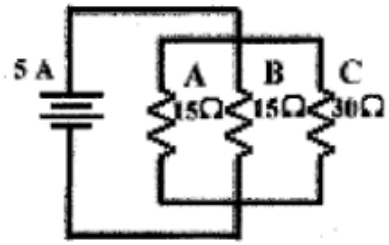


	V	I	R
R_1	10V	1.25A	8Ω
R_2	10V	1.25A	8Ω
R_3	10V	2.5A	4Ω
Total	10V	5A	2Ω

$\frac{1}{R_T} = \frac{1}{8\Omega} + \frac{1}{8\Omega} + \frac{1}{4\Omega} = \frac{1}{2\Omega} \Rightarrow R_T = 2\Omega$

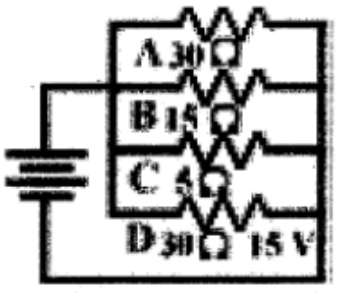


	V	I	R
R_A	30V	2A	15Ω
R_B	50V	2A	25Ω
R_C	20V	2A	10Ω
Total	100V	2A	50Ω



	V	I	R
R_A	30V	2A	15Ω
R_B	30V	2A	15Ω
R_C	30V	1A	30Ω
Total	30V	5A	6Ω

$\frac{1}{R_T} = \frac{1}{15\Omega} + \frac{1}{15\Omega} + \frac{1}{30\Omega}$



	V	I	R
R_A	15V	0.5A	30Ω
R_B	15V	1A	15Ω
R_C	15V	3A	5Ω
~~Total~~ R_D	15V	0.5A	30Ω
Total	15V	5A	3Ω

$\frac{1}{R_T} = \frac{1}{30} + \frac{1}{15} + \frac{1}{5} + \frac{1}{30}$

5) How would the brightness of the individual bulbs in a parallel circuit change as bulbs of the same resistance are added?

- does not change as long as the power source can provide the same I